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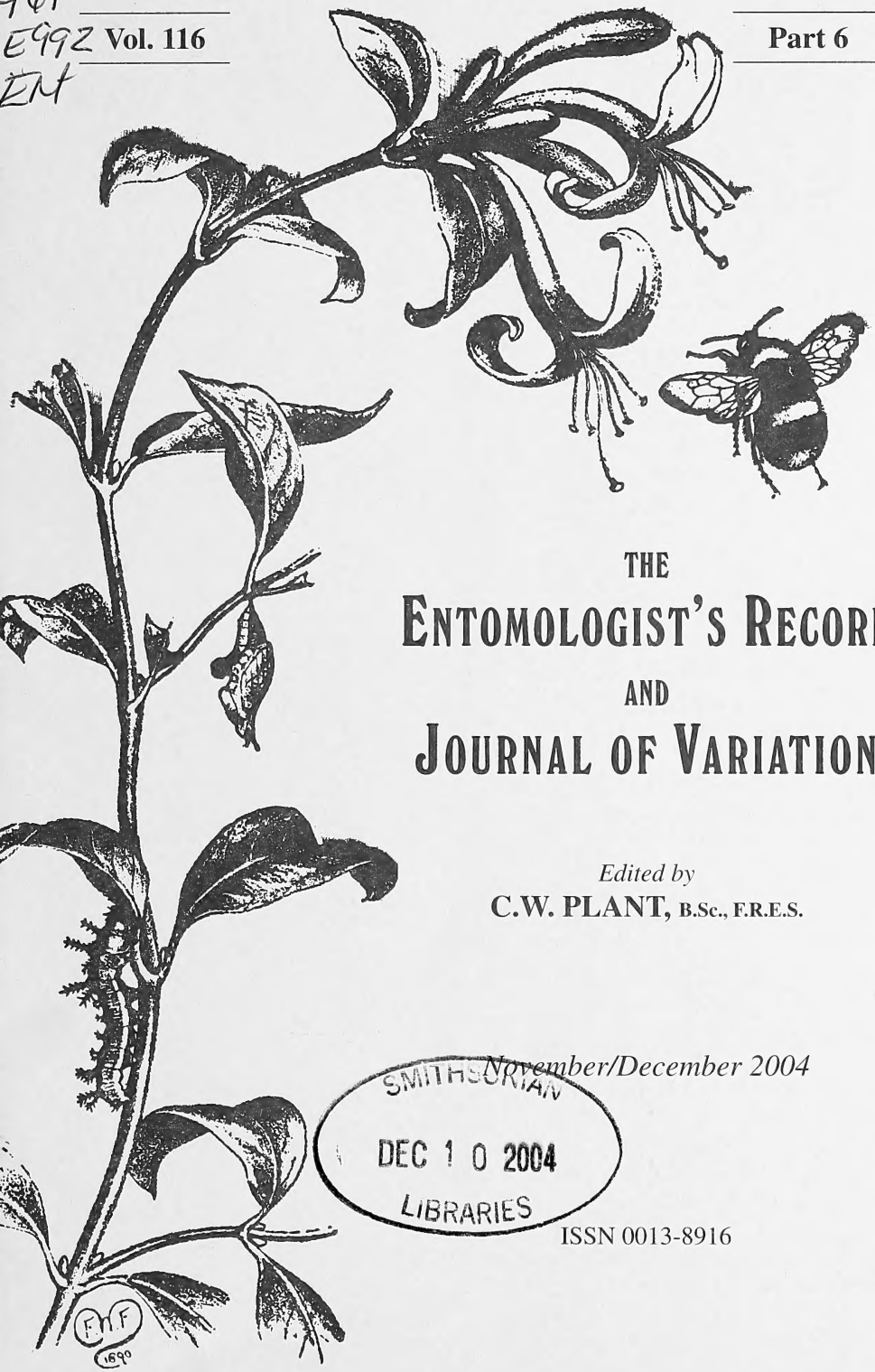

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C.W. PLANT, B.Sc., F.R.E.S.

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AN ANALYSIS OF MOTH WINGS FOUND AT THE FEEDING PERCH OF A BROWN LONG-EARED BAT *PLECOTUS AURITUS* (L.) (CHIROPTERA: VESPERTILIONIDAE) IN BLUNTISHAM, CAMBRIDGESHIRE, FROM 1980-1983

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Abstract

The wing remains of a total of 2,039 moths were collected from underneath the feeding perch of a Brown Long-eared Bat during 1980-83. Approximately 96% of the moths were of the family Noctuidae. The majority of the moth species identified are widespread and common in suburban habitats and probably reflected local conditions. Fifty-six percent were of just four species: the Dotted Rustic *Rhyacia simulans* (Hufn.), the Mouse Moth *Amphipyra tragopoginis* (Cl.), the Common Rustic *Mesapamea secalis* agg. and the Stout Dart *Spaelotis ravida* (D.& S.). Of these, the Dotted Rustic was experiencing a population explosion in eastern England at the time of the survey and the Stout Dart had also been increasing in previous years. Both these species and the Mouse Moth, aestivate or roost in sheds, outbuildings, under bark etc. The predominance of these species in the prey is discussed and it is suggested that these bats may be able to locate and exploit collections of aestivating or roosting Lepidoptera. Comparisons are made with several other similar British surveys. Only six species were common to all surveys.

Introduction

The Brown Long-eared Bat *Plecotus auritus* (L.) is one of Britain's commonest and most widely distributed species of bat and feeds exclusively on insects and other arthropods (Swift & Racey, 1983; Stebbings, 1988; Shiel *et al.*, 1991). The bat belongs to a group known as gleaning bats, in that a substantial proportion of their diet is caught by "gleaning" prey items off vegetation, the ground or other substrate rather than by aerial hawking (Anderson & Racey, 1991; Shiel *et al.* 1991). The presence of deciduous woodland in the vicinity of the bats' roost sites is thought to be key as a foraging habitat (Swift & Racey, 1983; Entwistle *et al.*, 1996). Suburban situations where there are plenty of deciduous trees are presumably also suitable.

A much higher proportion of moths is found in the diet of many gleaners than in that of many bats that are primarily aerial hawkers (Rydell *et al.*, 1995). A substantial part of the Brown Long-eared Bat's diet consists of noctuid moths. However, studies involving the analysis of faecal pellets from the roosts of these bats have revealed that they eat a wide range of other invertebrates including flies, beetles, caddis flies, shield bugs, lacewings, centipedes, spiders, earwigs etc. (Swift & Racey, 1983; Rydell, 1989; Shiel *et al.*, 1991). Depending on the time of year and location, the bat's diet may be expected to include 20-70% moths though 20-40% appears to be more usual (Swift & Racey, 1983; Rydell, 1989; Rydell *et al.*, 1995; Shiel *et al.*, 1991). Moths may be favoured prey items, as when moths are most abundant (in July and August), they form a substantially higher proportion of the

bat's diet than other orders which are also more abundant in midsummer (Shiel *et al.*, 1991; Williams, 1939).

Many moths (and some other insects) have primitive ears, known as tympanic membranes. These tympanate moths include Noctuidae, Geometridae, Notodontidae and Pyralidae, but not the Hepialidae (Faure *et al.,* 1993; Fullard, 1987). Tympanate moths are best able to hear the echolocation sounds of bats within the range of 20 to 40 KHz (Faure *et al.* 1990; Rydell *et al.* 1995). Aerial-hawking bats tend to emit long, high intensity ultrasonic echolocation calls of relatively low frequency in order to locate prey accurately at a distance while flying. These calls tend to be within the optimum hearing range of tympanate moths (Faure *et al.,* 1993; Rydell *et al.,* 1995). On hearing an approaching bat's ultrasonic calls these moths will take evasive action. Tympanate moths are about 40% less likely to be caught by aerial-hawking bats than non-tympanate moths (Rydell *et al.,* 1995) and consequently many aerial-hawking bats feed mainly on insects other than moths (Rydell *et al.*, 1995).

Gleaning bats (sometimes called "whispering", "quiet" or "listening" bats) have relatively broad wings (for slow, hovering flight) and large ears (for listening for sound produced by their prey). More often than not they locate their prey by listening for prey-generated sounds, such as fluttering, and may approach and capture their prey in silence, i.e. without using echolocation at all (Anderson & Racey, 1991; Faure & Barclay, 1992). When they do use echolocation to capture prey they emit short, low intensity (faint), high frequency ultrasonic sounds which are both relatively quiet and outside the optimum hearing range of tympanate moths, thereby escaping detection (Faure *et al.,* 1990; Waters & Jones, 1995). A proportion of their prey, including moths, is also caught by aerial hawking.

The frequent presence of non-flying arthropods in the bat's diet (e.g. the report of centipede remains in faecal pellets in an Irish study by Shiel *et al.,* 1991), suggests that the bats may also be able to hear the pattering of tiny feet (all those legs may not be such a good idea after all!) or may detect the disturbance of litter over which the arthropods are crawling. Long-eared Bats also have relatively large eyes compared with other species of bat, so eyesight may be also be used for prey location

Hibernating or roosting Lepidoptera may also be eaten by Long-eared Bats. The remains of the Herald Moth *Scoliopteryx libatrix* (L.) and the Small Tortoiseshell butterfly *Aglais urticae* (L.) have been found under bat perches (Poulton, 1929; Roer, 1969; Thompson, 1982; Warne, 1985; Chris Hall *pers. comm.*). However at other times hibernating Lepidoptera are left untouched (Roeder & Fenton, 1973). It has been suggested that bats may also be able to locate their prey by smell (Roer, 1969). Chris Hall (*pers. comm.*) reports that a Brown Long-eared Bat would not approach closer than about 15 centimetres to proffered moths if they had been kept in a match box rather than a glass jar, suggesting that the bat could smell residual chemicals from the previously stored matches.

Large prey items (especially noctuid moths) are taken to temporary feeding perches to be consumed; small prey items are presumably eaten while the bat is in flight, or whole while the bat is perching. The location of these perches can be found by the presence of discarded insect remains (chiefly moth wings) and bat droppings

underneath the perch, particularly where the perches are situated in a place where there is little wind to blow the insect remains away.

In August 1980, EJ discovered a feeding perch of a long-eared bat in a 'built-in' car port, open to the south, adjoining a residential house in the village of Bluntisham, Cambridgeshire (in Huntingdonshire, vice county 31). The bat was presumed to be the Brown Long-eared Bat. The only other species of long-eared bat in Britain is the very rare Grey Long-eared Bat *Plecotus austriacus* (Stebbings, 1988). This has subsequently provided us with an opportunity to investigate the diet of the Brown Long-eared Bat with respect to larger moths, perhaps to shed some light on the feeding behaviour of the bat and on the abundance and behaviour of moths in the area, and to make some comparisons with other similar studies, notably those of Thompson (1982) and Howes (1996, unpublished study), and those detailed by Poulton (1929). The habitat surrounding the feeding perch consisted of suburban gardens (to the east and west), a large playing field with scattered lines of mature and younger deciduous broad-leaved trees (north), and an extensive orchard of plum, apple and pear less than 30 metres away to the south.

On 9 August 1983, a dead Brown Long-eared Bat (positively identified) was found, still clinging to the wall, at the feeding perch. Numbers of moth wings collected had been high for several days previous to this, and although numbers of wings found subsequently dropped markedly, wings continued to be deposited in the same corner of the car port until the end of September. This strongly suggests that at least two bats were using the feeding perch, at least for a time (Figure 2).

Methods

Remains of moth wings were collected daily in 1980 beneath the temporary feeding perch at Bluntisham, from 6 August until 6 September, after which no more moth wings appeared that year. Similar collections were made daily in 1981, 1982 and 1983 from under the same perch from the first day in each year that moth wings appeared until no more wings were found at the end of the summer. Business commitments, requiring EJ to spend time away from home, account for the lack of data in early September of some years. Daily collections were kept separate for later identification.

Moth species were subsequently identified from the wing remains, as far as possible by pairing up wings to avoid duplication, and tending to err on the side of caution. It is likely, therefore, that the numbers of moths identified are slightly underestimated.

At the time the moth wings in this study were identified in the early 1980s, the species now known as the Common Rustic *Mesapamea secalis* and the Lesser Common Rustic *Mesapamea didyma* were treated as one. In 1983, two species were formally recognised. Although the wing remains were retained, the two species cannot be reliably separated without examination of the genitaliaand so, for the purposes of this study these two species have been lumped together.

Results

A total of 2,039 individual moths of 72 species was identified from wing remains collected at the Bluntisham bat perch between 1980 and 1983 (Table 1). In 1980, 93% of these were noctuid moths and in each of the following three years approximately 96% of the moths were noctuid moths making an overall average for the four years of 95.9% (Table 2). The remaining moths were a few representatives of the families Hepialidae, Pyralidae, Geometridae, Thyatiridae, Arctiidae and single representatives of the families Oecophoridae and Notodontidae.

In the years 1981, 1982 and 1983, 58%, 54% and 60% of the total moths comprised just four Noctuid species, namely the Dotted Rustic, the Stout Dart, the Common Rustic group and the Mouse Moth. The percentage each species made of the total in each of the three years and in 1980 is shown in Table 2.

Table 3 lists the 20 most frequent species (over the four years) at the Bluntisham feeding perch, and gives the percentage each made of the total catch in each year at Bluntisham. The table also shows a comparison with other surveys for those 20 species. Other datasets in the table are from Sheffield in 1921 (Poulton, 1929, but collected by Whitaker); Skelton in 1979 and 1980 (Thompson, 1982) and from Rossington near Doncaster in 1984 and 1991 (Howes, 1996, unpublished study). The survey entitled "1929 various" is a combination of a number of smaller surveys, individual details of which are given by Poulton (1929). These smaller datasets are from various British locations and dates (between 1905 and 1928) and as such are not strictly comparable with the other surveys, but they have been included here for interest.

Just six species of moth are common to all the surveys: the Large Yellow Underwing, the Lesser Yellow Underwing, the Heart and Dart, the Dark Arches, the Common Rustic and the Mouse Moth. The Large Yellow Underwing was always among the top three most frequent prey items in the earlier surveys, and at Rossington in 1991. However at Bluntisham it came out seventh overall, but second in the incomplete series of 1980. The Cabbage Moth *Mamestra brassicae* (L.) and the Silver Y *Autographa gamma* (L.) were also found more frequently overall at Bluntisham than the Large Yellow Underwing.

Figures 1-3 show the number of moths identified from the daily collections in the years 1981-83. In 1982, moth wings appeared somewhat earlier than in 1981 and 1983. The figures also show the number of Dotted Rustic, Stout Dart and Mouse Moth identified from daily collections, the differences in phenology of the three species being apparently reflected in the catches.

Discussion

Since the moth wings for this study were collected, a great deal more has become known about the feeding habits and diet of the Brown long-eared Bat, particularly from studies using captive bats and from studies involving the analysis of faeces from wild bats. It was previously thought that Brown Long-eared Bats fed predominantly on noctuid moths, whereas it has become clear that moths make up only between 20-40% of the bats' diet on average. At the height of summer, moths

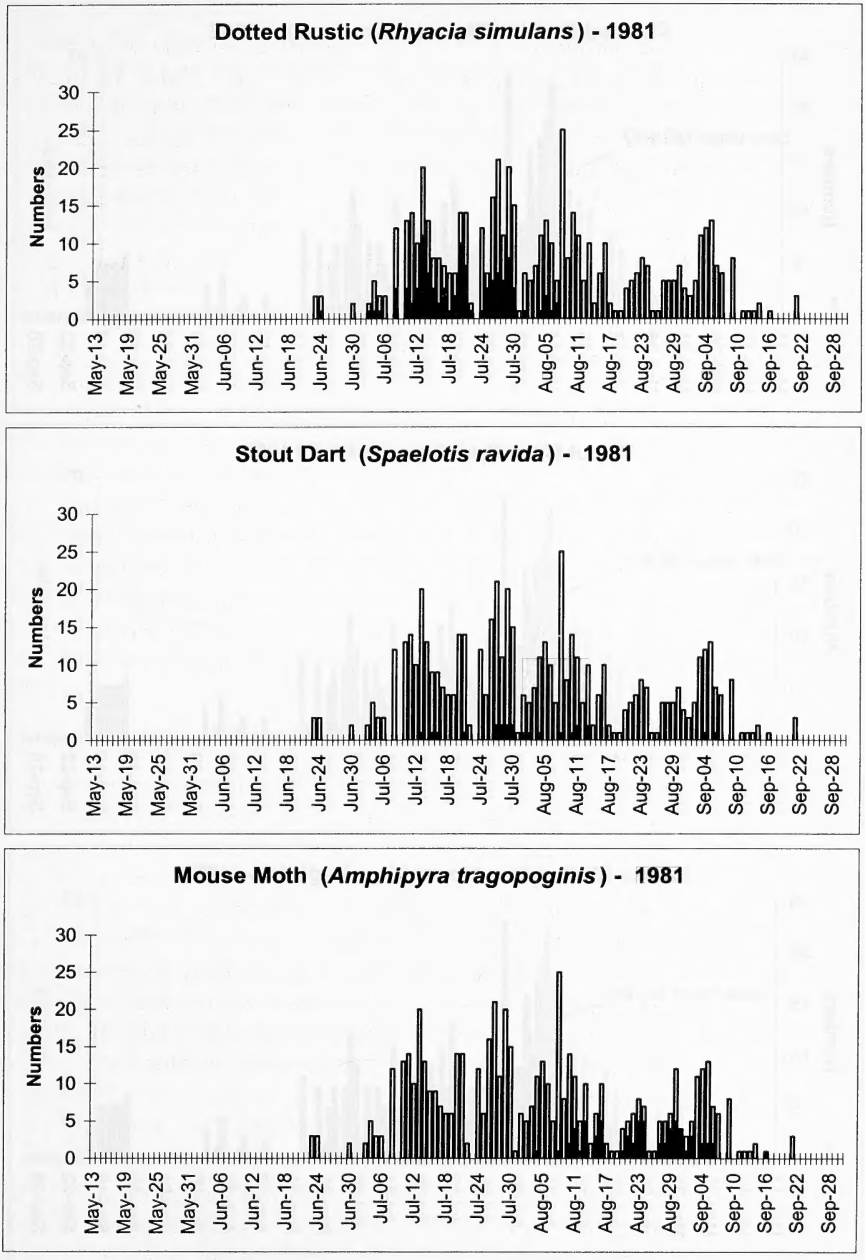

Figure 1. Total nos. of individual moths (wing remains) (clear + solid bar) and nos. of three species of noctuid moths (solid bar) collected daily in 1981 from under a feeding perch of a Brown Long-eared Bat in Bluntisham, Cambridgeshire.

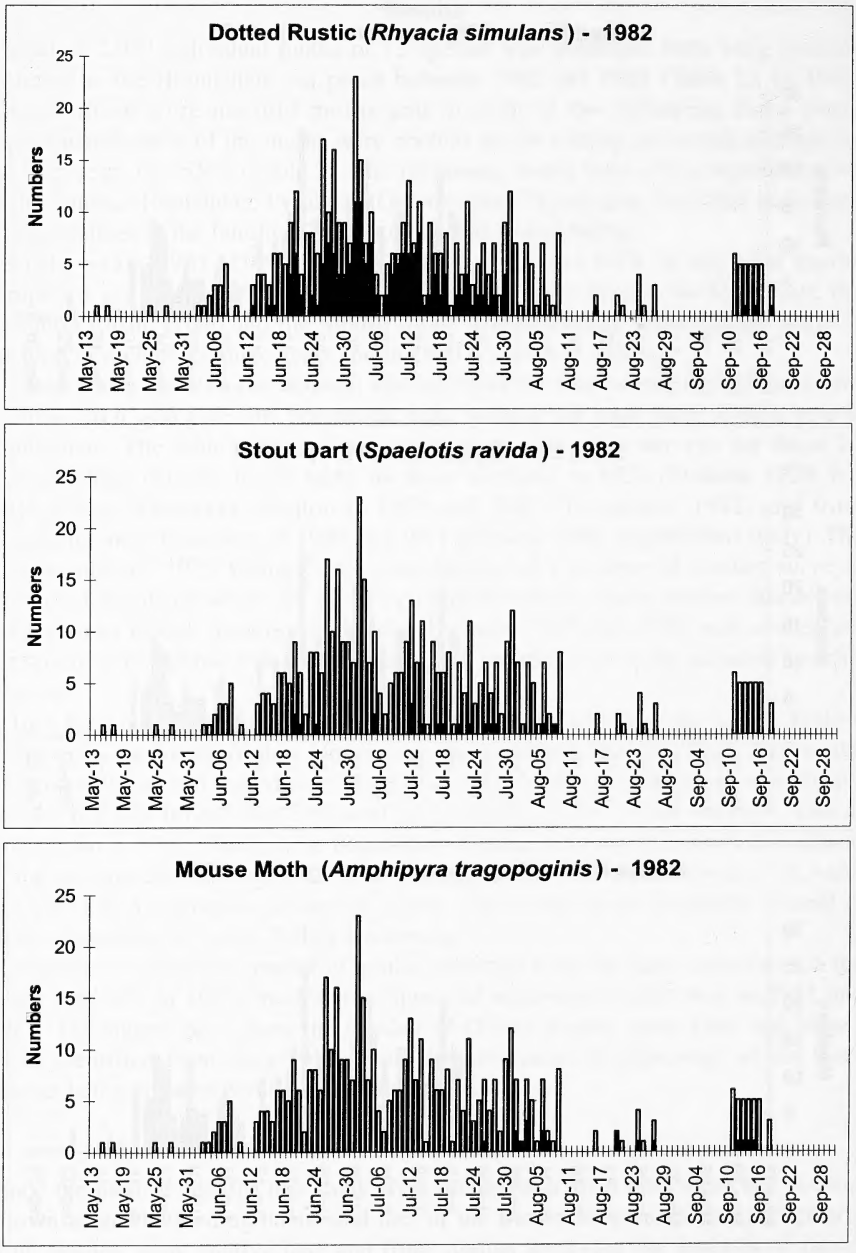

Figure 2. Total nos. of individual moths (wing remains) (clear + solid bars) and nos. of three species of noctuid moths (solid bar) collected daily in 1982 from under a feeding perch of a Brown Long-eared Bat in Bluntisham, Cambridgeshire.

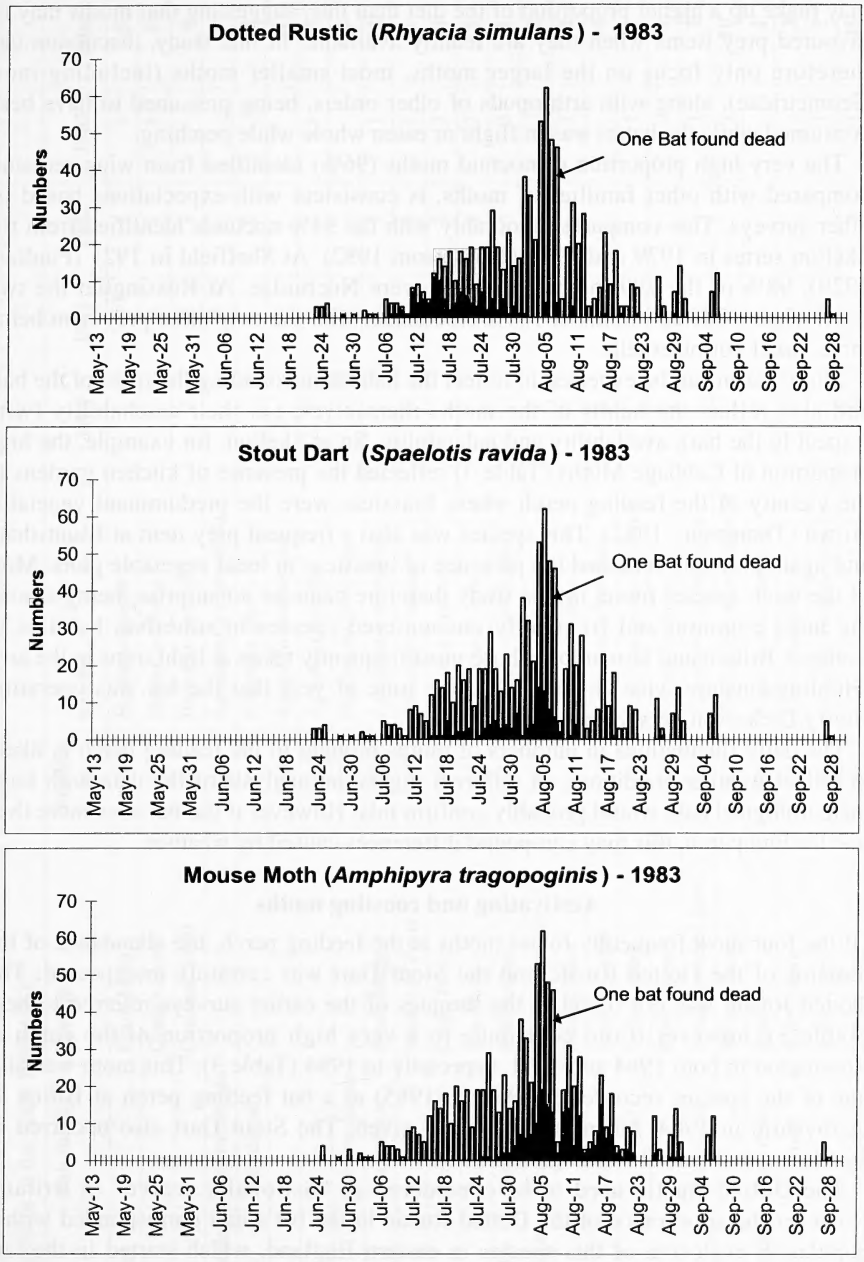

Figure 3. Total nos. of individual moths (wing remains) (clear + solid bar) and nos. of three species of noctuid moths (solid bar) collected daily in 1983 from under a feeding perch of a Brown Long-eared Bat in Bluntisham, Cambridgeshire.

may make up a higher proportion of the diet than this, suggesting that moths may be favoured prey items when they are readily available. In this study, discussion can therefore only focus on the larger moths, most smaller moths (including most Geometridae), along with arthropods of other orders, being presumed to have been consumed while the bat(s) was in flight or eaten whole while perching.

The very high proportion of noctuid moths (96%) identified from wing remains, compared with other families of moths, is consistent with expectations based on other surveys. This compares favourably with the 94% noctuids identified from the Skelton series in 1979 and 1980 (Thompson, 1982). At Sheffield in 1921 (Poulton, 1929), 98% of the 799 moths identified were Noctuidae. At Rossington the two series were made up of almost 100% Noctuidae, with the only other prey item being three Small Tortoiseshells.

Moths taken can be expected to reflect the habitat surrounding the roost of the bats and also reflect the habits of the moths themselves, i.e. their catchability (with respect to the bat), availability and palatability. So at Skelton, for example, the high proportion of Cabbage Moths (Table 3) reflected the presence of kitchen gardens in the vicinity of the feeding perch where brassicas were the predominant vegetable grown (Thompson, 1982). This species was also a frequent prey item at Bluntisham and again probably reflected the presence of brassicas in local vegetable plots. Most of the moth species found in this study therefore came as no surprise, being among the most common and frequently encountered species in suburban habitats in southern Britain and also among those most frequently taken at light traps in the area (Huntingdonshire, vice county 31) at the time of year that the bat was operating (Barry Dickerson *pers. comm.*).

The daily fluctuations in numbers of moths brought to the feeding perch is likely to reflect weather conditions on different nights; an analysis of the data with local meteorological data would probably confirm this. However if the bat uses more than one feeding perch, this may compound differences caused by weather.

Aestivating and roosting moths

Of the four most frequently found moths at the feeding perch, the abundance of the remains of the Dotted Rustic and the Stout Dart was certainly unexpected. The Dotted Rustic was not found in the samples of the earlier surveys referred to here (Table 3), however it did contribute to a very high proportion of the catch at Rossington in both 1984 and 1991, especially in 1984 (Table 3). This moth was also one of the species recorded by Warne (1985) at a bat feeding perch at Hilton in Derbyshire in 1984, but no numbers are given. The Stout Dart also occurred in significant numbers at Rossington in 1984.

The Dotted Rustic used to be considered as "nationally scarce" in Britain. However the appearance of the Dotted Rustic in the bat's diet corresponded with a population explosion of this species in eastern England, which started in the late 1970s (Waring, 1992). In fact the first county record for this species for the old county of Huntingdonshire was on 27 August 1979 (Scott, 1979). In 1980, a further 18 examples were recorded in Huntingdonshire, including the 9 found at the Brown

Table 1. Annual totals of moths (estimated from wing remains) collected from under a feeding perch of a Brown Long-eared Bat in Bluntisham, Cambridgeshire in the years 1980-1983.

Family	Sub-family	Species	Bradley no.	Species	1980	1981	1982	1983	Total
Hepialidae		Ghost Moth	14	*Hepialus humuli*		1	1	3	**5**
		Orange Swift	15	*Hepialus sylvina*		1	1	3	**5**
		Common Swift	17	*Hepialus lupulinus*	2	1	1		**4**
Oecophoridae	Depressariinae		715	*Agonopterix capreolella*		1			**1**
Pyralidae	Crambinae			*Crambus* spp.			2		**2**
			1304	*Agriphila straminella*		1			**1**
			1305	*Agriphila tristella*	1	1		1	**3**
	Schoenobiinae		1329	*Donacaula forficella*		1			**1**
	Pyraustinae	Small Magpie	1376	*Eurrhypara hortulata*			1	11	**12**
		Mother of Pearl	1405	*Pleuroptya ruralis*			1	1	**2**
	Pyralinae	Large Tabby	1421	*Aglossa pinguinalis*			2	2	**4**
	Galleriinae	Bee Moth	1428	*Aphomia sociella*		2	1	2	**5**
Thyatiridae	Thyatirinae	Buff Arches	1653	*Habrosyne pyritoides*		4	5	2	**11**
Geometridae	Sterrhinae	Small Blood-vein	1682	*Timandra comae*	1		1		**2**
		Riband Wave	1713	*Idaea aversata*	1			1	**2**
	Larentiinae	Garden Carpet	1728	*Xanthorhoe fluctuata*	1	3			**4**
		Yellow Shell	1742	*Camptogramma bilineata*				1	**1**
		Dark Spinach	1749	*Pelurga comitata*	1				**1**
	Ennominae	Swallow-tailed Moth	1922	*Ourapteryx sambucaria*		1		1	**2**
		Willow Beauty	1937	*Peribatodes rhomboidaria*		3		7	**10**
Notodontidae	Phalerinae	Buff-tip	1994	*Phalera bucephala*	1				**1**
Arctiidae	Arctiinae	Buff Ermine	2061	*Spilosoma luteum*	2	1			**3**
		Ruby Tiger	2064	*Phragmatobia fuliginosa*		1		1	**2**
Noctuidae	Noctuinae	Garden Dart	2082	*Euxoa nigricans*	14	7	3	21	**45**

Family	Sub-family	Species	Bradley no.	Species	1980	1981	1982	1983	Total
		Turnip Moth	2087	*Agrotis segetum*	1	7	25	10	**43**
		Heart and Dart	2089	*Agrotis exclamationis*		5	24	10	**39**
		Dark Sword-grass	2091	*Agrotis ipsilon*		3	2	12	**17**
		Shuttle-shaped Dart	2092	*Agrotis puta*	2			7	**9**
		Flame	2098	*Axylia putris*				1	**1**
		Flame Shoulder	2102	*Ochropleura plecta*				9	**9**
		Dotted Rustic	2105	*Rhyacia simulans*	9	111	158	113	**391**
		Large Yellow Underwing	2107	*Noctua pronuba*	17	26	14	17	**74**
		Lesser Yellow Underwing	2109	*Noctua comes*	11	17	4	25	**57**
		Least Yellow Underwing	2112	*Noctua interjecta*		3	7	18	**28**
		Stout Dart	2113	*Spaelotis ravida*	3	23	19	106	**151**
		Ingrailed Clay	2120	*Diarsia mendica*				3	**3**
		Setaceous Hebrew Character	2126	*Xestia c-nigrum*	1	13	3	33	**50**
		Double Square-spot	2128	*Xestia triangulum*			1		**1**
		Square-spot Rustic	2134	*Xestia xanthographa*	1	4	2	8	**15**
	Hadeninae	The Nutmeg	2145	*Dicestra trifolii*		1	1	3	**5**
		Cabbage Moth	2154	*Mamestra brassicae*	14	43	16	22	**95**
		Dot Moth	2155	*Melanchra persicariae*		6	1	2	**9**
		Bright-line Brown-eye	2160	*Lacanobia oleracea*	3	10	11	6	**30**
		Smoky Wainscot	2198	*Mythimna impura*	1	2	1	3	**7**
		Common Wainscot	2199	*Mythimna pallens*		2	2	4	**8**
	Cuculliinae	Dark Brocade	2250	*Blepharita adusta*			1		**1**
		Lunar Underwing	2270	*Omphaloscelis lunosa*			1	1	**2**
		Orange Sallow	2271	*Xanthia citrago*	1				**1**
	Acronictinae	Dark Dagger/Grey Dagger	2283/4	*Acronicta tridens/psi*	1		2		**3**
		Knot Grass	2289	*Acronicta rumicis*			1	1	**2**

Family	Sub-family	Species	Bradley no.	Species	1980	1981	1982	1983	Total
		Coronet	2291	*Craniophora ligustri*				1	**1**
	Amphipyrinae	Copper Underwing	2297	*Amphipyra pyramidea*	1	2			**3**
		Mouse Moth	2299	*Amphipyra tragopoginis*	24	67	19	177	**287**
		Straw Underwing	2303	*Thalpophila matura*	1	4		1	**6**
		Angle Shades	2306	*Phlogophora meticulosa*	1	26	23	22	**72**
		Dark Arches	2321	*Apamea monoglypha*	8	8	3	16	**35**
		Light Arches	2322	*Apamea lithoxylaea*	1	1	7	2	**11**
		Large Nutmeg	2333	*Apamea anceps*		2	4		**6**
		Rustic Shoulder-knot	2334	*Apamea sordens*		1	5		**6**
		Marbled Minor	2337	*Oligia strigilis*		1	5		**6**
		Cloaked Minor	2341	*Mesoligia furuncula*		2			**2**
		Common Rustic	2343	*Mesapamea secalis agg.*	13	117	51	134	**315**
		Flounced Rustic	2353	*Luperina testacea*		1	1	1	**3**
		Rosy Rustic	2361	*Hydraecia micacea*		4			**4**
		The Uncertain	2381	*Hoplodrina alsines*	1	3	2		**6**
		Mottled Rustic	2387	*Caradrina morpheus*			1		**1**
		Pale Mottled Willow	2389	*Paradrina clavipalpis*		1	1	2	**4**
		unknown species	-	unknown species			1		**1**
	Plusiinae	Burnished Brass	2434	*Diachrysia chrysitis*		1		1	**2**
		Silver Y	2441	*Autographa gamma*	4		12	63	**79**
		Spectacle	2450	*Abrostola tripartita*		1			**1**
	Catocalinae	Red Underwing	2452	*Catocala nupta*				1	**1**
	Ophiderinae	Herald	2469	*Scoliopteryx libatrix*	1	1	2	3	**7**
Totals:					144	548	452	895	**2039**
Number of species:									**72**

Long-eared Bat's feeding perch that year (Greatorex-Davies, 1981). The Stout Dart was also experiencing a time of relative plenty, Skinner (1984) states ". . .this species is now flourishing in many parts of southern, central and eastern England . . .".

Both these species emerge in late June and in July but can be found through to September or even October. Both aestivate for a time in refuges such as sheds, outhouses and other buildings, or under loose bark (Skinner, 1984). Dotted Rustics have been found aestivating together in numbers in outbuildings (Barry Dickerson *pers. comm.).*

Both the Dotted Rustic and the Stout Dart are caught in the Rothamsted light traps, but relatively infrequently. However, from those that have been caught it appears that the Dotted Rustic reached a peak in abundance between 1984 and 1988, whereas the Stout Dart seemed to peak between 1968 and 1978 (Ian Woiwod *pers. comm.*). Since then it appears that both species have declined.

The Mouse Moth emerges later than the preceding two species (as was reflected in the captures at Bluntisham, see Figures 1-3), but can also be found roosting together in numbers by day in similar situations. This moth is often abundant and occurs regularly in light traps. What is perhaps more interesting is that it is the most frequent species caught in the 12 metre Rothamsted suction traps, indicating that this species is a high flyer! (Ian Woiwod *pers. comm.*) (Taylor, 1974). The Mouse Moth was by far the most abundant moth caught in a Rothamsted suction trap at Cardington during August and September 1959 (Taylor & Carter, 1961). Greater than an order of magnitude more individuals (355) of this species was taken than the next most abundant species on that occasion, the Large Yellow Underwing (14), another apparent favourite of the Brown Long-eared Bat (Thompson, 1982).

The apparent selection of species that roost or aestivate in buildings etc. and under bark is intriguing. As has already been mentioned, Small Tortoiseshell butterflies are also sometimes included as prey items. Proportionately large numbers of Small Tortoiseshell wings (49 out of a sample of 128 forewings) were found at a Long-eared Bat perch in a church belfry in North Wales in late March 1995 (Chris Hall *pers. comm.*). Other species present (eg Large Yellow Underwing) indicated that at least some of the wing remains collected had been there since the previous summer. The Old Lady Moth (*Mormo maura*) (Linnaeus 1758) has also been found as a prey item on occasions (Poulton 1929; Chris Hall *pers. comm.*), including one in the porch of the church in Hemingford Grey, Huntingdonshire, in the summer of 1995. It may be that these bats are able to locate and exploit aestivating or roosting moths. Perhaps if one of a group of roosting moths flutters and is heard by a bat, the lives of the whole collection of hibernators are put in jeopardy. They can certainly readily locate and capture moving prey while on the ground (Poulton, 1929; Chris Hall *pers. comm.*), and these moths may roost in similar locations to the bats themselves, therefore becoming particularly vulnerable to predation. Swift & Racey (1983) found the remains of clothes moths (Tineidae) and blowflies (Calliphoridae) in faeces of Brown Long-eared Bats which were roosting in the attic of a large house. As both these types of insect commonly occur in such roof spaces, the authors suggest that the bats caught them inside the roost. Roer (1969) suggested that long-

Table 2. The percentage of the total number of moths identified from wing remains at the Bluntisham Brown Long-eared Bat feeding perch for the four most frequent moth species (all Noctuidae), remaining Noctuidae, other families and total Noctuidae for the years 1981-83.

Year:	**1980**	**1981**	**1982**	**1983**	**1981-83**	**All years**
Dotted Rustic *Rhyacia simulans*	6.3%	20.3%	35%	12.6%	20.2%	19.2%
Common Rustic *Mesapamea secalis* agg.	9%	21.4%	11.3%	15%	15.9%	15.4%
Mouse Moth *Amphipyra tragopoginis*	16.7%	12.2%	4.2%	19.8%	13.9%	14.1%
Stout Dart *Spaelotis ravida*	2.1%	4.2%	4.2%	11.8%	7.8%	7.4%
Other Noctuidae:	59%	38%	41.8%	36.8%	38.3%	39.8%
Other families:	6.9%	4%	3.5%	4%	3.9%	4.1%
Total Noctuidae:	**93%**	**96%**	**96.5%**	**96%**	**96.1%**	**95.9%**
Total numbers:	144	548	452	895	1805	2039

eared bats could locate stationary prey by smell, after finding that a captive bat confined in a cage with hibernating Herald Moths and Small Tortoiseshell butterflies would feed on them (quoted in Thompson, 1982).

However there may be other reasons for the predominance of these moths as prey items. For example, it could be the sheer abundance of the species concerned, or particular selection by the bat for these species from other situations (e.g. presence at honeydew, ability to identify from fluttering sounds or by smell), or some other unknown or unconsidered aspect of the moths' behaviour causing them to be particularly vulnerable to predation.

Aposematic moths

There is conflicting evidence as to whether some moths, notably the Arctiidae, are avoided by long-eared bats because they are distasteful. From this and the previous studies examined here, it would appear that arctiids are mostly avoided. Only two species of Arctiid were among the prey items identified at Bluntisham, the Buff Ermine *Spilosoma luteum* (Hufn.) (three specimens) and the Ruby Tiger *Phragmatobia fuliginosa* (L.) (two specimens). Arctiids were also found in other studies (Poulton, 1929; Thompson, 1982), but, as here, in low numbers and nearly all were the Buff Ermine. However two White Ermine *Spilosoma lubricipeda* (L.) were included in one of the series detailed by Poulton (1929). The Buff Ermine emerges slightly later and, having a lower level of toxins than the White Ermine, is likely to be less distasteful to the bat.

Table 3. Comparisons between different British surveys: the percentage of the total number of moths identified from Brown Long-eared Bat feeding perches at various sites in different years for the 19 most frequent species identified (overall) at Bluntisham, listed in order of abundance. Data for Sheffield and "various" are taken from Poulton 1929; Skelton: Thompson 1982; and Rossington: Howes 1996.

P = present, but in very low numbers; - = not recorded; blank square = data unavailable.

Year:	**1921** Sheffield	**1929** Various	**1979** Skelton (York)	**1980** Skelton	**1980** Bluntisham	**1981** Bluntisham	**1982** Bluntisham	**1983** Bluntisham	**1984** Rossington (Doncaster)	**1991** Rossington
Total no. of moths in sample:	**799**	**529**	**160**	**809**	**144**	**548**	**452**	**895**	**48**	**149**
	%	%	%	%	%	%	%	%	%	%
Dotted Rustic *Rhyacia simulans*	-	-	-	-	6.3	20.3	35.0	12.6	67.0	29.5
Common Rustic *Mesapamea secalis* agg.	9.9	5.5	5.6	9.8	9.0	21.4	11.3	15.0	-	0.7
Mouse Moth *Amphipyra tragopoginis*	4.9	8.3	1.9	-	16.7	12.2	4.2	19.8	13.0	6.0
Stout Dart *Spaelotis ravida*	-	-	-	-	2.1	4.2	4.2	11.8	6.0	-
Cabbage Moth *Mamestra brassicae*	5.3	4.0	20.6	9.8	9.7	7.8	3.5	2.5	-	-
Silver Y *Autographa gamma*	1.1	4.2	10.0	18.0	2.8	-	2.6	7.0	-	-
Large Yellow Underwing *Noctua pronuba*	22.9	33.3	16.8	29.2	11.8	4.7	3.1	1.9	2.0	20.8
Angle Shades *Phlogophora meticulosa*	0.6	1.1		p	0.7	4.7	5.1	2.5	-	-
Lesser Yellow Underwing *Noctua comes*	6.5	7.4	26.8	10.9	7.6	3.1	0.9	2.8	2.0	12.1

Year:	**1921** Sheffield	**1929** Various	**1979** Skelton (York)	**1980** Skelton	**1980** Bluntisham	**1981** Bluntisham	**1982** Bluntisham	**1983** Bluntisham	**1984** Rossington (Doncaster)	**1991** Rossington
Setaceous Hebrew Character *Xestia c-nigrum*	-	0.4	-	-	0.7	2.4	0.7	3.7	-	-
Garden Dart *Euxoa nigricans*	-	0.9	-	-	9.7	1.3	0.7	2.3	-	-
Turnip Moth *Agrotis segetum*	0.9	1.3	-	-	0.7	1.3	5.5	1.1	-	2.7
Heart and Dart *Agrotis exclamationis*	0.4	1.1		p	-	0.9	5.3	1.1	-	3.3
Dark Arches *Apamea monoglypha*	26.4	13.4	6.9	6.7	5.6	1.5	0.7	1.8	6.0	13.4
Bright-line Brown-eye *Lacanobia oleracea*	0.3	1.1	-	1.4	2.1	1.8	2.4	0.7	-	-
Least Yellow Underwing *Noctua interjecta*	-	-	-	-	-	0.5	1.5	2.0	-	-
Dark Sword-grass *Agrotis ipsilon*	-	0.8	-	-	-	0.5	0.4	1.3	-	-
Square-spot Rustic *Xestia xanthographa*	0.6	0.2	-	-	0.7	0.7	0.4	0.9	-	0.7
Small Magpie *Eurrhypara hortulata*					-	-	0.2	1.2	-	-
Buff Arches *Habrosyne pyritoides*	-	-		0.1	-	0.7	1.1	0.2	-	-

At the Skelton feeding perch in 1979 a single specimen of the Garden Tiger moth *Arctia caja* (L.) was found (Thompson, 1982). The moth was untouched except for tooth marks deeply embedded in its thorax, suggesting that the moth was dropped in disgust!

In contrast to the above, on 17 June 2002, Martin Corley (*pers. comm.*) found mostly arctiid remains at a long-eared bat's feeding perch on his farm in Oxfordshire. At the perch he found the wing remains of at least 25 Buff Ermines and seven White Ermines. The only other moth remains he found at the perch were those of six Ghost Moths *Hepialus humuli* (L.) and one Large Yellow Underwing. This bat at least seemed to like these arctiids.

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Geranium Bronze *Cacyreus marshalli* (Butler, 1898) (Lep.: Lycaenidae) and other interesting butterflies on Fuerteventura, Canary Islands

I visited Fuerteventura during March and April of 2004 in two entomological trips. Several butterflies species were seen at the west and south of the islands. One example of *Danaus plexippus* (L.) was seen at Vega de Río Palmas while *Danaus chryssipus* (L.) was flying between Betancuria and the last locality, and probably, belongs to the Barranco de Ajui population. Its food plant is, in this island, *Callaruma burchardi*, which grew in some locations at Vega de Río Palmas. In this area there were also many *Euchloe belemia hesperidum* (Rothschild), only seen in March, as well as *Pontia daplidice* (L.), *Colias crocea* (Fourc.), *Euchloe charlonia* (Donzel), *Vanessa cardui* (L.) and *Polyommatus icarus* (Rott.), all of them seen in March and April.

At the southern end of Fuerteventura (Jandía), near Morro Jable, I caught one example of *Zizeeria knysna* (Trimen), which has a few records from this island. This lycaenid was flying closed to damp ground into the hotel. On 9 April, while I was investigating the presence of *Leptotes pirithous* (L.) on the edge of the salt marsh in front of lighthouse, I could see several specimens of *Cacyreus marshalli* and caught one male. Inside the hotel where I stayed, another male was caught and I also saw a female. The presence of this butterfly in Fuerteventura could be the result of accidental introduction from the neighbouring island (Lanzarote) through the trade in ornamental plants between both of islands (although I could not find any signs of eggs or larvae on plants of *Pelargonium* sp.). On the other hand it could, perhaps, have come with the dust-laden strong winds that often they arrive from the nearby African coast, approximately 114 kilometres distant. This is a new record of this butterfly for Fuerteventura which, apparently, continues its advance through all the Canary Islands.— Benedicto Acosta Fernandez, Molino de Viento,19. 3º B, 35004 Las Palmas de Gran Canaria, Spain (E-mail: benedictoacosta@redfarma.org).

A surprising record for *Eucosma tripoliana* (Barrett) (Lep.: Tortricidae)

On the night of 13 August 2004, I operated a m.v. moth trap in the garden of my sister-in-law at Longbridge Deverill, Wiltshire. It was something of a surprise in the morning to find three slightly worn specimens of *E. tripoliana*, sufficiently remarkable for me to dissect one to confirm the identity. Not only does this constitute a new county record, but the site is inland, about 50 miles from the coast whether north and south, and the only known food plant *Aster tripolium* is consequently not recorded anywhere near this locality. The species is not known to migrate and there were no other indicators of migrant activity in the trap. The remaining option is that an alternative host plant is being used, the trap was placed near the Wylie river, so an examination of riverside Compositae might be worthwhile. — David Agassiz, 23 St James's Road, Gravesend, Kent DA11 0HF.

Tree Lichen Beauty *Cryphia algae* (Fabr.) (Lep. Noctuidae), breeding in Britain

The remarkable coincidence of *Cryphia algae* visiting my garden mv light at Dartford, Kent in the three consecutive years 2000, 2001 and 2002, one specimen in each year, in a locality rarely associated with immigrant moths from the Continent, was reported in *Ent. Rec.* **115**: 39. The moth was first reported in Britain 1859 in Cheshire, doubtless having arrived amongst imported material; records of immigrants did not commence until the 1990s. In 1990, a specimen was reported in Guernsey by Michael Chalmers-Hunt and Bernard Skinner (*Ent. Rec.* **104**: 123). In 1991, two examples were recorded on the south coast of England, to be followed by two more in 1992 and six in 1995 (Burrow, *Ent. Rec.* **108**: 153). The peak of this invasion during the 1990s occurred in 1996, thirteen specimens being seen along the south coast of England, and one inland at a garden in Bishop's Stortford, Hertfordshire (summarised in Skinner and Parsons, *Ent. Rec.* **111**: 153). Subsequently numbers seen annually fell and in 2000 only five specimens were recorded for the south coast, plus one at Dartford, (summarised by Skinner and Collins. *Ent. Rec.* **116**: 15). The example that I recorded at Dartford in 2002 was not the only one to be seen in north-west Kent in that year, five being noted at Barnehurst by Tony Steele at his garden m.v. light, in a large mainly residential area two and a half miles to the north (Waring, 2003. *British Wildlife* **14**: 211).

In 2003, two moths were observed at Dartford, on 27 July and 10 August, and others were seen at Barnehurst. In addition to immigrants recorded on the south-east coast of Kent, four specimens were seen in Regents Park, Central London, by Tim Freed, the first on 8 July being significantly earlier than the main invasion on the coast (Plant, 2003. *Ent. Rec.* **115**: 292).

In 2004, my garden mv light attracted fifteen examples of *Cryphia algae* on 27 July (1), 30 July (1), 31 July (2), 21 August (3), 4 August (1), 6 August (1), 7 August (2) and 8 August (4). This provides substantial evidence for the presence of a local breeding colony. However, of more significance is the experience of Tony Steele at Barnehurst, which he has kindly given me permission to quote. His garden light trap attracted forty-seven specimens of *C. algae* from 27 July to 22 August, with a maximum of nineteen on 29 July. Of these, the 34 examples seen up to and including 29 July were removed and not released until after 29 July, precluding duplicate sightings.

Dartford and Barnehurst, although close to the Thames Estuary, are nevertheless remote from the coastal locations visited in small numbers by immigrant *C. algae* each year for over a decade. The evidence suggests a local breeding population of the species in a restricted area of north-west Kent, probably for a period of four years. My garden, within close proximity to a large mixed woodland, suggests that the latter might be the focus of local breeding, but the Barnehurst experience indicates otherwise, and that this species' habitat comprises the gardens, wasteland and parkland of residential estates in these instances, perhaps also mixed woodland in the case of Dartford.— B. K. West, 36 Briar Road, Dartford, Kent DA5 2HN.

Hazards of butterfly collecting. Pity poor Buddha – South India, September, 1986

I set out with Gordon Thompson on 16 September 1986 in search of *Papilio buddha* Westwood. It was extremely rare in the Nilgiri Mountains where I lived at the time, and generally rare everywhere (I had seen only three in four months). It was also usually impossible to catch. *P. buddha* (the Buddha Peacock) is one of the metallic green Swallowtails of the *Papilio palinurus*-group. It is among the most beautiful butterflies in India, or for that matter the world; all the Peacock Swallowtails are beautiful but somehow the tone of green, vivid yet soft, and lacking any blue gives it an edge, perhaps a lack of some slight garishness. Gordon knew a place some 200 km further north in the Kanara District of Karnataka State, and that was where we were heading.

Papilio buddha is strictly endemic to the true lowland rainforests of the Western Ghats and does not extend to Sri Lanka; this pattern is shared with Malabar Banded Swallowtail *P. liomedon* Moore and the Malabar Raven *P. dravidarum* Wood-Mason, as well as red-bodied Malabar Rose *Pachliopta pandiyana* Moore. The huge Southern Birdwing *Troides minos* Cramer is somewhat more robust, frequenting also less dense forest and higher altitudes. The Crimson Rose *Pachliopta hector* L., the Blue Mormon *Papilio polymnestor* Cramer and the Common Banded Peacock *Papilio crino* Fabricius inhabit drier areas, though *P. polymnestor* also flies in forest; all three extend to Calcutta and Bangladesh, but are still effectively South Indian endemics, and do not reach Calcutta every year. Finally, the Paris (Tamil) Peacock *Papilio paris tamilana* Moore is so distinctive that it could be considered a species in its own right. So, *P. buddha* forms part of an unusually large group of endemic and semi-endemic Swallowtails given the relatively low overall level of endemicity in South India.

Gordon had fixed us up with a lovely forest bungalow, inside the forest along a lovely river, and we had a simple dinner. Gordon promised better next day, for he would be casting for *masheer* in the river bubbling past our veranda. We listened to the 22.00 news on the BBC World Service; of all things to take to the bush a radio capable of getting the World Service is the one I would most miss.

Over breakfast Gordon told me that his *buddha*-place had been discovered about fourteen years earlier and had been the only place they knew where *P. buddha* was quite common. It was on some old temple grounds, about 150 metres from the forest edge, a wasteland that had numerous large *Clerodendron squamosum* bushes, with their huge, almost spherical scarlet flower-clusters. All Swallowtails in the area converged on these flowers in the morning hours from 09.00 till 13.00. Gordon also said that *buddha* was attacked by a species of sunbird that did not attack other Swallowtails, which sounded odd; he said there would be ample opportunity to observe it.

We reached the spot early; Gordon insisted that we should see the first Swallowtails actually leaving the forest. There were hardly any butterflies when we arrived, but soon they started coming, in ones or twos. Once there, they stayed for a long time, and soon more Swallowtails were milling about than I have ever seen on a single

flower patch. It did not take long to get a good series of all the South India endemics and some voucher material of the other *Papilio*. *Pachliopta*, *Chilasa*, and *Graphium* were very thin on the ground so we got 'only' 12 Swallowtails in all – out of a South Indian total of 19.

There were several Sunbirds around, too. Of these, only one would chase or attack the *P. buddha*. This was the male of the tiny Purple-Rumped Sunbird *Nectarinia zeylonica sola* Viellot, which arrived on the scene a bit later than the first *P. buddha*. The moment a male of one of these Sunbirds spied a *P. buddha* approaching, they flew off to intercept, with audible clicks of the beaks. The much larger butterfly was mostly chased off without evident harm, but sometimes bits of wing fell off first, and in one case the forewing costa was broken and the butterfly wholly disabled. Those *P. buddha* that managed to reach the flowers, suffered less aggression. During our two days we saw more than 25 such attacks.

The immediate thought was that the Sunbird was trying to protect an important food source, *Clerodendron* being a fine nectar plant not only in India. However, no other Swallowtails were attacked, though their flight patterns were quite similar, and none of the few Sunbirds of other species ever attacked butterflies at all – nor did females of the perpetrator. I believe the true answer is that the Sunbird looks at *P. buddha* as a supernormal rival. The green band of the Swallowtail is of just the same tone as the crown and scapulars (wing-shoulders) of the bird, but much more extensive. The evidence was a bit too thin for acceptance of the paper by a major ornithological journal, but I do not have the imagination to find another reason. For more information on South Indian Swallowtails and *P. buddha* see my separate papers (1987. *Papilio Intl.,* **3**:202-205, and 1998. *Papilio Intl.*, **4**: 275-294).

In the afternoon we collected in the forest but saw very few Swallowtails. At 15.00 Gordon went off fishing for *masheer*, one of the best sporting fish in India. I went to see him in his little pool and was able to imagine that it was a pleasant way of passing time. He only got two fish, each adequate for one person; the taste of *masheer* is great, the eating of food gathered by your own expedition giving an added pleasure. But those small additional, free trifurcate bones are a nuisance. I would prefer my fish bigger, which is still possible in India. Gordon later showed me pictures of some of his best catches, sometimes in rivers so small they looked incapable of housing a family of sticklebacks.– TORBEN B. LARSEN, Bangladesh, World Bank, 1818 H. Street N. W., Washington D.C., 20433, USA (E-mail: torbenlarsen@compuserve.com).

Butterfly Recording Scheme for Cyprus – a request for records

Readers with an interest in the butterflies of Cyprus may well be aware that I have published distribution maps, based on UTM 10 km squares (John, E. 2000. Butterflies of Cyprus 1998 (Records of a year's sightings) in *AES Pamphlet* No.15). The addition of records from many more sources enabled updated versions of these maps to be published in Makris (2003. *Butterflies of Cyprus*. Bank of Cyprus Cultural Foundation, Nicosia).

I am now in the process of converting all records to re-distribute them within UTM 5 km squares, and hope to have these published in the not too distant future. I should be most interested to hear from any reader who has not previously been in touch and who may have records to contribute – whatever the vintage. Those who contributed significantly to the records for Makris (2003) received a complimentary copy of the book, courtesy of the publishers. While I cannot commit myself to making a similar offer, this will again be my intention. I mention this merely as an alluring incentive!

Anyone wishing to have more information on the Recording Scheme, or on the butterflies of Cyprus, is invited to visit my website http://www.grayling.dircon.co.uk/index.html or is most welcome to contact me direct.— EDDIE JOHN, Davies Cottage, Penllyn, Cowbridge, Vale of Glamorgan CF71 7RQ (E-mail: eddie@grayling.dircon.co.uk).

Barberry Carpet Moth *Pareulype berberata* (D. & S.) established in Lincolnshire

On 29 June 2004, I was most pleased to beat a single larva of the Barberry Carpet moth *Pareulype berberata* from the site in Lincolnshire where we have been making efforts to establish a population of this endangered species, for which collecting without a licence is illegal under Schedule 5 of the Wildlife & Countryside Act (1981). The larva was released back onto the bushes and beating was limited so as not to overly disturb the rest of the population. The significance of the discovery is that it confirms that the moth has bred for a minimum of six generations in the wild in Lincolnshire since the last release of livestock (900 larvae) at this site on 13 July 2001. The first release (1300 larvae) was in June 1999, with a second release (569 larvae) on 28 June 2000. Prior to this project, the Barberry Carpet moth was last seen in Lincolnshire on 22 May 1918, by the Rev. S. Proudfoot at North Somercotes (Duddington & Johnson, 1983. Lincolnshire Naturalists' Union). During the late 1980s and 1990s, I made several attempts to find the species in Lincolnshire, Nottinghamshire and Yorkshire, but without success, including numerous searches over a ten year period at the release site. The Barberry Carpet formerly occurred in many counties in England, and reached at least as far north as Yorkshire, but it has declined massively as a result of agricultural measures to eradicate Barberry from the countryside (Waring, 2000. *British Wildlife* **11**: 175-182). Bushes of Common Barberry *Berberis vulgaris*, the sole larval foodplant in the wild, have been grubbed up by many farmers, where-ever found, ever since the late nineteenth century when

Barberry was discovered to be a secondary host of the Wheat-rust fungus *Puccinia graminis*. Barberry eradication was being recommended by the Ministry of Agriculture, Food and Fisheries (MAFF) at least as recently as the 1970s and I have seen that it still takes place, even though the modern strains of Wheat now grown are rust-resistant. By 1987, only one population of the Barberry Carpet Moth was known to survive in England and this was lost in the 1990s as a result of scorching of the occupied bushes by a fire in an adjacent field of stubble. Further information on this moth and its conservation is provided in the selected references below and in a series of confidential reports to English Nature.

The establishment project in Lincolnshire is part of a species recovery programme which has been funded by English Nature and is in partnership with the Lincolnshire Wildlife Trust. I am now continuing the Lincolnshire part of the project with support from Writtle College, Essex.— PAUL WARING, Reader, Centre for Environment & Rural Affairs, Writtle College, Essex. Contact address: Windmill View, 1366 Lincoln Road, Werrington, Peterborough, PE4 6 LS (E-mail: paul_waring@btinternet.com).

A weekend's mothing on Alderney

From 14-16 May 2004 Dr Phil Sterling joined my wife Pat and me as guests of Dr Struan Robertson on Alderney. Our visit coincided with the Alderney Wildlife Trust's Wildlife Weekend and we were able to join in some of their events, notably the evening bat walks lead by Struan and a boat trip to see the offshore Gannet colonies. Alderney is the third largest of the Channel Islands and the most northerly. It is also the closest to France; the Normandy coast, some eight miles away, can often be seen clearly. Indeed, on several occasions during our visit, the enormous nuclear waste reprocessing plant at Cap de la Hague was glimpsed glinting alarmingly in the late spring sunshine.

Although the island is small, about 3½ miles long by 1½ miles wide and covering under 2000 acres, there is a variety of habitats including rocky shores, sandy beaches and dunes, wetland, nutrient-poor grassland and heathland. Even though the island has sometimes been described as being treeless – as long ago as 1862 Ansted and Latham in *The Channel Islands* held that "Alderney and Sark are very badly provided with trees" - this was not our impression (nor of Sark). Certainly this view might still be gained today when approaching the island by air, but the valleys and a number of other areas are wooded, although there appeared to be few trees older than 60 years as large numbers were felled for fuel by the German occupying forces during the latter part of World War II. Ash *Fraxinus excelsior*, Sloe *Prunus spinosa* and *domestica*, Grey Willow *Salix cinerea* ssp. *cinerea* and some short-lived Elm *Ulmus* spp. suckers are present, but Sycamore *Acer pseudoplatanus* is by far the most common species. But if the island does not completely want for trees, it does lack hedgerows, and this deficit is a relic of a strip agriculture and communal rough grazing system, which was employed well into the last century.

In preparation for our visit, a search of the literature revealed that nothing has been published on the Lepidoptera of Alderney, certainly in the journals available to

us, since the Guernsey naturalist Luff published a series of five papers in the years from 1874 to 1903. However, Rich Austin, the Guernsey Moth Recorder, was able to provide us with a list of 229 macrolepidoptera and 108 microlepidoptera species made up mainly of his own observations and those of visitors whose records had been passed to him, and to this we were able to add a further 18 species.

Actinic light traps were run at two sites. In Struan's garden in St. Anne we took the Scarce Chocolate-tip *Clostera anachoreta* which has been the subject of a separate note in this journal (*antea.* 222). In a wooded area near Longis Common we were pleased to find the Early Tooth-striped *Trichopteryx carpinata* which has been recorded from La Manche, Normandy, although not from the area closest to Alderney. This is a new vice-county record. In the same area the galls of *Monochroa cytisella* were noted on Bracken *Pteridium aquilinum* and larvae collected from a White Poplar *Populus alba* proved on rearing to be those of *Gypsonoma aceriana.*

Also in St. Anne, we found three case-bearing species all of which are new to the island: at our host's house, larvae and adults of the Common Clothes Moth *Tineola bisselliella* were noted in and around a piece of discarded carpet. At the cricket ground at Les Buttes, during a barbecue, the cases of *Bankesia conspurcatella* were found in great numbers on fences posts just below the level of the grass, a habitat quite different from those in which we have found the moth on Guernsey and Sark (Costen, 2003, *Ent. Rec.* **115**: 224-225; Sterling & Costen, in press, *Ent.Gazette*). On several algae-covered walls Phil found many cases of *Luffia ferchautella* which is of particular interest as only *Luffia lapidella* had been recorded previously from the Channel Islands. The cases were notably smaller than those of *lapidella* and from the several he collected only females emerged but then, in September, hundreds of tiny larvae with minuscule cases were seen crawling around the pot in which the females were being kept. In the absence of any males these must have developed parthogenetically, hence their identification as *ferchautella.*

The extent of coastal heathland, about 400 acres, mostly concentrated to the south-west of this small island, surprised us. We noted the beautiful Spotted Rock-rose *Tuberaria guttata* in large numbers, and the Greater Broomrape *Orobanche rapum-genistae*, which is parasitic on Prostrate Broom *Cytisus scoparius maritimus*, was also surprisingly frequent. Some of the moths found there, although new to the island list, were not unexpected, for example, *Pempelia palumbella* and *Eudonia angustea,* but another pyralid, *Mecyna asinalis*, was remarkable because its foodplant, Wild Madder *Rubia peregrina*, is very rare on Alderney. However, the one known stand of the plant showed the typical signs of *asinalis* feeding and Phil found a larva although, unfortunately, I failed to rear it through to the adult stage. Interestingly, there are three reliable recent records of this moth from Guernsey where Wild Madder was last recorded in 1870.

Further to the west, at La Giffoine, a search of the Prostrate Broom produced larvae of three species which were all reared through to the adult stage: *Agonopterix scopariella, Agonopterix nervosa* and *Mirificarma mulinella.*

At Saye Bay, on the north of the island, a search of the Sea-holly *Eryngium maritimum* specifically for larvae of *Agonopterix cnicella* was successful and the

single larva found was reared through to the adult stage. This was of special interest as several previous searches on Guernsey, and especially on Herm, had proved unsuccessful. And at Crabby Bay some old stems of Viper's-bugloss *Echium vulgare* were gathered and a month later produced a large number of *Tinagma ocnerostomella.* Both of these species are new vice-county records. At Braye Bay Phil found a larva *of Acleris aspersana* feeding on Creeping Cinqufoil *Potentilla reptans* and two adults of *Aproaerema anthyllidella.*

Finally, since Phil mentioned to me in passing several years ago that the moth I had been recording for some time in Guernsey as *Cydia succedana* was in fact not that species at all but *Cydia ulicetana*, and that *succedana* was a different species apparently not found in Britain, I have become interested in this common tortricid which is found in numbers in Guernsey wherever Gorse *Ulex europaeus* grows. A short series was collected from several parts of Alderney and on dissection all proved to be *ulicetana* as has been the case with specimens examined from Guernsey, Sark and Herm.

As always I am grateful to Phil Sterling for his support and on this occasion especially for checking a few of my *ulicetana* dissections. Struan Robertson could not have been more hospitable nor Roland Gauvain and Graeme Neal of the Alderney Wildlife Trust more helpful.— P. D. M. Costen, La Broderie, La Claire Mare, St. Peters, Guernsey GY7 9QA. (E-mail: pcosten@guernsey.net).

***Lymantria monacha* (L.) (Lep.: Lymantriidae): extension of range**

This species seems not to have been an inhabitant of north-west Kent, including what is now regarded as south-east London, for some two hundred years, excepting at Darenth Wood during the 1860s and the West Wickham area a decade earlier (Chalmers-Hunt, 1961-63. The Butterflies and Moths of Kent. Suppl. *Ent. Rec.* **74**: 58). As that author suggests, the species had a largely Wealden distribution in Kent. A hundred years later, in the mid-twentieth century, the species was again reported as present in the West Wickham area, due to a lack of published records or a recrudescence following long absence. Also, in the 1940s it was noted in the well-wooded Petts Wood neighbourhood. However, no further records appeared in Chalmers-Hunt's work, which included records until 1980.

Two male *Lymantria monacha* observed on a high wall behind a street light at Dartford on 24 August 1946 seem to be the first for this area. The location is not far from my present residence where I commenced to operate an m.v. light in 1969 However, more than fifty years were to elapse before *L. monacha* came to the light, suggesting that the 1946 specimens were vagrants from elsewhere. Two males were attracted to the light in 2002, on 28 July and 3 August. A further specimen arrived on 30 July 2003 and in 2004 two more appeared – on 20 and 25 July. This suggests the species may be established locally, probably in the neighbouring mixed woodland, indicating an extension of range as has occurred with several other species in north-west Kent for the first time, or after a very long apparent absence, such as *Hyloicus*

pinastri (L.), *Eilema depressa* (Esp.)., *Aporophyla nigra* (Haw.) and *Chloroclysta siterata* (Hufn.)— B. K. WEST, 36 Briar Road, Dartford, Kent DA5 2HH.

EDITORIAL NOTE: Records of Black Arches *Lymantria monacha* in Hertfordshire and Middlesex appear to confirm B. K. West's supposition that this species is extending its range. In these two counties, the species began to appear during 1997 and 1998 at well-recorded sites from which it had until then been apparently absent (see discussion and distribution map in Plant, 1999. *London Naturalist* **78**: 147 – 171). In Hertfordshire alone, published records suggest (Foster, 1937. *Trans. Herts Nat. Hist. Soc.*) that it was widespread in the older woodlands of southern Hertfordshire from around 1890 to the 1930s (though this is supposition as Foster's records were seldom accompanied by dates). However, in the years from about 1950 to 1970 there were reports from only four sites. In the years 1997 to 2003, on the other hand, the Herts Moth Database shows records from no less than 60 sites and these are spread across the entire county including the largely oak-free northern half, on the border with Cambridgeshire, suggesting that some other trees or trees and being used by the larvae. I have recorded larvae feeding on Hornbeam in Hertfordshire in 2000.— COLIN W. PLANT

Some observations on moths nectaring at flowers

Like many entomologists, I have piles of diaries, field note-books and files stacked full of interesting observations which I have never reported. The writing of the new Field Guide to Moths (Waring, Townsend & Lewington, 2003) provided an all too brief opportunity to re-examine some of these accumulated data. One of the topics I seem to have recorded a lot of information about and never brought together concerns moths nectaring at flowers at dusk and after dark. A brief search of the standard textbooks of the last 150 years shows that many include a short discourse on the value of examining natural attractants including flowers, over-ripe fruit, aphid honeydew and oozing sap when searching for moths. Generally, the merits are extolled of investigating catkins of sallows such as Goat Willow *Salix caprea* in the spring, Ivy blossom *Hedera helix* in the autumn, and plants such as Ling Heather *Calluna vulgaris* and Common Ragwort *Senecio jacobaea* in the summer, Honeysuckle *Lonicera periclymenum* for long-tongued hawk-moths such as the Large Elephant Hawk *Deilephila elpenor*, along with inspections of naturalised exotics such as Buddleia *B. davidii*, Red Valerian *Centranthus ruber* and garden cultivars of Tobacco plant *Nicotiana* spp. and Phlox *Phlox paniculata*. If you want more detail on which species visit what and when, one of the best sources is still J.W. Tutt's "Practical Hints for the Field Lepidopterist (1901-1905, reprinted by the AES in 1994), which is always a source of inspiration and fascination. Having re-read the above and conducted a brief computer literature search, which of course failed to find the myriad of relevant observations included in reports of field meetings and excursions in the entomological journals, I include the following thoughts and observations as a small and possibly preliminary contribution to

compliment others on the subject, and in the hope that it will stimulate others to report the more interesting of their discoveries.

Numbers of moths visiting flowers after dark

First I find that the numbers of moths seen visiting flowers are seldom reported. On a good night considerable numbers can be seen. For example, on the night of 31 July 1984 I counted the following moths nectaring at the flowers at 22.00 hours, just after dusk, on a 100 metre by 3metre stretch of a somewhat larger stand of flowering Creeping Thistle *Cirsium arvensis* growing along the main north-south ride through the centre of Waterperry Wood in Oxfordshire:

> Mottled Beauty *Alcis repandata* 17 individuals, Common Footman *Eilema lurideola* 13, Small Fan-footed Wave *Idaea biselata* 9, Common Wave *Cabera exanthemata* 8, July Highflyer *Hydriomena furcata* 7, Rosy Footman *Miltochrista miniata* 4, Maiden's Blush *Cyclophora punctaria* 3, Dunbar *Cosmia trapezina* 2, Common Emerald *Hemithea aestivaria* 2, Common Rustic/Lesser Common Rustic *Mesapamea* agg. 2, Dark Umber *Philereme transversata* 1, Snout *Hypena proboscidalis* 1. Total 68 macro-moths of 12 species.

The previous night had seen the first significant rain for weeks. It remained cloudy that morning, clearing to a sunny warm afternoon and a clear, still evening with an air temperature of 12°C and a new crescent moon when the above count was made. The results demonstrate that geometrid moths are sometimes much more numerous than noctuids in visiting flowers and that arctiids such as the Common Footman also can be frequent.

Comparison with moths at sugar

The moths visiting flowers on a particular night can be quite a different range of species to those visiting sugar, wine-ropes and other such baits on the same night. For example, on the same night the above count was made on flowers, I painted single vertical sugaring strips 30 cm × 2 cm on the trunks of 15 trees along the edge of the same woodland compartment. The sugaring mixture comprised Fowler's black treacle, stale Guinness beer and a couple of drops of amyl acetate. About thirty moths of five species were recorded, as follows:

> Common Rustic/Lesser Common Rustic 1 or 2 per strip, Dark Arches *Apamea monoglypha* 1, Herald *Scoliopteryx libatrix* 1, Smoky Wainscot *Mythimna impura* 1, Heart and Dart *Agrotis exclamationis* 1.

The sugar attracted only noctuid moths and only one of the species seen at the flowers, even though the most numerous moths on the flowers were geometrids and arctiids. I have recorded a few of the latter, and of other families such as the Thyatiridae, at this particular blend of sugaring mixture on other nights, but it seems general experience that noctuid moths overwhelmingly predominate at this type of attractant.

Flower inspection for recording less frequent moths

Although the majority of species seen visiting flowers are likely to be those also numerous at light-traps in the same habitat, less frequently seen species also turn up

regularly, such as the Dark Umber above, so a search of the flowers in the neighbourhood is always worthwhile to compliment light-trapping and other field techniques. Examination of flowers such as Lesser Burdock *Arctium minus* and Teasel *Dipsacus fullonum* can be the best way of seeing the Square-spotted Clay *Xestia rhomboidea* early in the night because it has proved to be generally a late arrival at light-traps, often not entering them until well after midnight and thus being missed by some people who do not trap all night (see *British Wildlife* **14**: 134).

There are some well-known reports of flowers used as day-time lures for particular species, such as the Broad-bordered White Underwing *Anarta melanopa,* which can be attracted by taking scented garden flowers such as Cherry Laurel *Prunus laurocerasus* up into its montane moorland habitats. The same technique has been used for the Bee Hawk-moths *Hemaris* spp. in the lowlands. Clearwing moths are sometimes found at flowers such as Common Hawthorn *Crataegus monogyna.*

Moths visiting flowers of grasses and reeds

I have often seen moths such as the Angle Shades *Phlogophora meticulosa* and various of the wainscots such as the Smoky Wainscot, Common Wainscot *M. pallens* and Striped Wainscot *M. pudorina* visiting the flower-heads of grasses in meadows and sand-dunes, and of Common Reed *Phragmites australis* in fens. Frequently such flower-heads are found to be sticky with the products of ergot fungus, which is the reason the moths are visiting them, as Angus McCrae and I discovered for ourselves about twenty years ago, never got round to publishing at the time, but which was subsequently reported via Jon Clifton (*Atropos* **10**: 53).

A few interesting records of nectaring moths

The extent to which moths show preferences for particular species of nectar flowers is likely to vary from one species to another. Some are not very choosy. The subject of flower selection and preference has received much more attention from butterfly enthusiasts. Factors such as proboscis length and the dimensions of flowers are important, colour and scent may be and of course not all flowers produce nectar, and some only at certain times of the day or night. In my own garden, it is obvious that Gatekeeper butterflies *Pyronia tithonus* mainly visit our Fleabane *Pulicaria dysenterica* and are seldom seen on the Hemp Agrimony *Eupatorium cannabinum* flowering alongside at the same time, and much loved by nymphalids such as the Peacock *Inachis io* and Red Admiral *Vanessa atalanta* which show little or no interest in the Fleabane, although the Painted Lady *V. cardui* and Small Tortoiseshell *Aglais urticae* sometimes visit Fleabane as well. At night the Hemp Agrimony flowers are alive with moths. A typical evening on my two garden clumps, each roughly 2m x 2m, on 27 July 2003, produced Mother of Pearl *Pleuroptya ruralis* 6, Common Rustic/Lesser Common Rustic 2, Common Carpet *Epirrhoe alternata* 2, Riband Wave *Idaea aversata* 1, Yellow Shell *Camptogramma bilineata* 1, Silver Y 1, Garden Pebble *Evergestis forficalis* 1. The Fleabane was devoid of moths this particular night and is generally much less popular.

Below, I take the opportunity of reporting a few of my observations of moths nectaring at native flowers. I have selected them on the basis that the moth or the

native plant is not one of those usually quoted elsewhere. Unfortunately, until, if ever, all my notes are entered onto a data-base, much information has proved too time-consuming to retrieve at present. This problem will be familiar to many of us. We all need several life-times to adequately process the data we can collect in the field. Hopefully others with time and interest might assemble more extensive tables from their own field notes. I would urge compilers of county lists to include as much of this type of information as possible, in addition to locally obtained larval foodplant records and other such detail, because county lists can provide a marshalled repository for this information. Species-specific ecological observations of all types are increasingly of interest now that more effort is being directed at surveying moths and managing habitats to conserve them.

Table: Selected interesting nectaring records (see text)

Moth	**Flower visited dusk onwards**	**Date**
Silver Y *Autographa gamma*	Common Hawthorn *Crataegus monogyna*	Late May
Maiden's Blush *Cyclophora punctaria*	Alder Buckthorn *Frangula ulnus*	Late June
Common Emerald *Hemithea aestivaria*	Wild Privet *Ligustrum vulgare*	Mid July
Mottled Beauty *Alcis repandata*	Wild Privet *Ligustrum vulgare*	Mid July
Common Wave *Cabera exanthemata*	Wild Privet *Ligustrum vulgare*	Mid July
Scallop Shell *Rheumaptera undulata*	Valerian *Valeriana officinalis* by day (13.00 hours)	Mid July
Dark Umber *Rheumaptera undulata*	Creeping Thistle *Cirsium arvensis*	Late July
Brimstone *Opisthograptis luteolata*	Wild Parsnip *Pastinaca sativa*	Early August
Birch Mocha *Cyclophora albipunctata*	Common Ragwort *Senecio jacobaea*	Early August
Yellow Shell *Camptogramma bilineata*	Betony *Stachys officinalis*	Early August

For those who have a garden "at their command" as Tutt put it, rather characteristically, nectar plant information can also be used as a guide as to what to plant to attract moths, somewhat as advised by L. Hugh Newman in his classic

"Creating a butterfly garden" and by other authors of numerous later works. The most popular among the nectar plants I grow in my own slightly alkaline garden with Lepidoptera in mind, are Goat Willow, Marjoram *Origanum vulgare*, Buddleia, Hemp Agrimony, Fleabane and Lavender *Lavandula* spp. and all reward inspection for moths after dark.

On mothing at sallow catkins

When Tutt and others refer to "sallowing" for moths they are mostly concerned with nocturnal inspecting and beating of the catkins of the Goat Willow *Salix caprea*, which I have found to be by far the most attractive sallow for nectaring moths. Some of the trees produce the familiar yellow male catkins, other trees produce the greener female catkins. As Tutt observed, both the male and female catkins are attractive to moths. Moths often get some of the pollen on their bodies and can visit in such numbers that they must provide an important means of pollination. I have noticed that the green female catkins have a faint but fragrant scent, but you may need to hold the catkin to your nose to detect it. On some nights I have seen several dozen nectaring moths of the genus *Orthosia* on sallow catkins by the light of my torch beam, and have had more than fifty by gently tapping a catkin-laden branch over my beating tray. Usually there are a few Red Chestnut *Cerastis rubricosa* amongst the Quakers and Drabs, and there is always the chance of a more unusual species. As Tutt reported over one hundred years ago, the density of moths visiting sallow catkins is usually greatest where sallow trees are thinly scattered, rather than where they occur in large groups, and the largest numbers of moths are seen on the edges of woodland and mature scrub, rather than in very open conditions. The moths begin to arrive from dusk and accumulate in the first hour or two of darkness.

Moths visiting Ivy flowers

Ivy is an important nectar source and a major attractant for moths at a time of the year when there are likely to be few other nectar flowers in the vicinity. In *Br. J. ent. Nat. Hist.* **16**: 51-53, Martin Townsend and I reported how we recorded 14 species of moths at a clump of flowering Ivy on 23 September 2000 at the Rushy Meadows SSSI in Oxfordshire. Seven of these species were not seen at any of the six mercury vapour light-traps which were operated on the site that night. We also reported that there was a progression of different species to the ivy during the course of the night, with several not arriving until after 01.00 hours.

Moths visiting Buddleia

The summer of 2003 seemed to me to be a particularly good one for seeing moths feeding at flowers after dark. This may have been a consequence of the many warm dry nights, in southern Britain, coupled with occasional rain, such that the vegetation did not become too dry and nectar flow was maintained. A particularly sight was recording between twenty and thirty Silver Y moths *Autographa gamma* most actively visiting a single bush of *Buddleia davidii* at dusk on the hot night of 6 August 2003 (27°C at dusk, 15°C minimum night temperature) at our local allotments in Werrington, Peterborough. With individual moths making short

looping flights to other flowers on the bush, and with several individuals doing so at any one time, illuminated by a nearby yellow sodium street-light, the bush looked just like a firework splitting sparks!

This publication was prepared in my new appointment as part-time Reader at Writtle College, University of Essex. I am most grateful to Writtle College for the financial support to enable me to prepare these and other moth data for publication and to initiate new lines of moth research. — PAUL WARING, Reader, Writtle College. Address for correspondence: Windmill View, 1366 Lincoln Road, Werrington, Peterborough, PE4 6LS. (E-mail: paul_waring@btinternet.com).

Applications for permits to collect Lepidoptera in Spain for scientific purposes

There seems to be a good deal of confusion amongst British entomologists concerning the scientific study of butterflies and moths in Spain. The purpose of this note is to clarify matters as they stand at November 2004.

The starting point is that collecting without a permit is illegal; this *appears* to include using a net even if specimens are not retained. However, permits are obtainable if the rules are followed and if sufficient time is allowed for the advance applications for permits. To stand any chance of being successful, you must ideally belong to *SHILAP* (Sociedad Hispano-Luso-Americana de Lepidopterologica). This Society it is open to all persons and institutions with interest on the study of the Lepidoptera all over the World. The annual subscription is paid at the beginning of the year and is €60.10 for the Fellows and €150.25 for institutions. You may pay by Postal Money Order, with credit card or by bank-transfer provided that there is no cost to SHILAP. Payment request should be made to the SHILAP account at Bank Bilbao Vizcaya Argentaria [Madrid] (bank code IBAN ES06 0182 1216 2802 0151 5543). The postal address of the society is SHILAP, Apartado de Correos 331, E-28080 Madrid, Spain and the e-mail address of the Director is *avives@eresmas.net*. In addition to being able to apply for permits, Fellows also receive the journal *Revista de Lepidopterologia*. Permit applications must satisfy the following conditions:

1. SHILAP's annual fee must be paid before applying for the permits.
2. A letter applying for the permit must be addressed to the General Secretary of SHILAP, including name, surname, address, Passport number, telephone number and fax number with country code and prefix, and/or e-mail address. This must reach the General Secretary **at least 45 days in advance** of the foreseen collecting activity.
3. The following data must be provided – the proposed collecting area (province and/or autonomous community), expected dates (days, months, even the whole year), collecting methods (entomological net, generator, etc), taxonomic groups of interest to be collected (species, genera, families and/or superfamilies) and any other data the applicant wishes to add.

4. All members of SHILAP who apply for these permits to collect Lepidoptera in Spain for scientific purposes, will be included in a *Project of Scientific Investigation* created by the Society and called "Lepidopterological Fauna of the Iberian Peninsula, Balearic Islands and Macaronesian region".

5. In order to contribute to this scientific project, you must send to SHILAP two paper copies of the list of recorded species together with a file in EXCEL format (only) on a diskette, indicating the Family, Subfamily, Tribe, name of the species (genera, species, author name and year), town, UTM, province, dates of capture, collector and numbers of males and females captured). Sequence and names should follow *Catalogo sistemdtico y sinonimico de los lepidopteros de la Peninsula Iberica y Baleares (Insecta: Lepidoptera) (Segunda pane)* (A. Vives Morena, 1994).

6 You may only collect a maximum of five examples of each taxon.

7 If any new species are discovered publication **must** be offered to the journal *Revista de Lepidopterologia* and a part of the Type series must also be donated to SHILAP for later incorporation to the collection of Lepidoptera of the National Museum of Natural History in Madrid, Spain.

It is hoped that by following these few simple rules, entomological research in Spain may continue to be undertaken by British citizens. It should be added that Portugal is not a party to these rules and collecting there for scientific purposes is, apparently, controlled in the same manner that it is in Britain. Collecting in Andorra, which lies on the border between Spain and France, is restricted in the same manner as collecting in Spain, but I have been unable to discover, for the moment, how to best apply for permits.— COLIN W. PLANT, 14 West Road, Bishops Stortford, Hertfordshire CM23 3QP.

ARASCHNIA LEVANA (L., 1758), A NEW SPECIES FOR THE MACEDONIAN BUTTERFLY FAUNA (LEP. : NYMPHALIDAE)

DIME MELOVSKI

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Abstract

Araschnia levana (Lepidoptera: Rhopalocera: Nymphalidae) is recorded for the first time in the fauna of the Republic of Macedonia from Shar Planina Mountains, Skopje region, Jakupica Mountains, Ograzhden Mountains, Galichica Mountains, Kavadarci and Kratovo region. Records are mapped for Mcedonia and the flight period is discussed.

Introduction

Butterflies (Rhopalocera) are one of the best studied animal groups in the Republic of Macedonia. Intensive research was conducted during the twentieth century by many authors and number of articles was published. The most comprehensive work was that of Thurner (1964) where 185 species of Rhopalocera were published. It was supplemented by Schaider & Jaksic (1988) and total of 199 species was presented, with maps of distribution. Further investigation revealed that *Gonepteryx cleopatra* L., 1767 should be included in Macedonian butterfly fauna (Krpac & Mihajlova, 1997). With the present inclusion of *Araschnia levana* a total of 201 species are now known for the Republic of Macedonia.

Investigations were undertaken in different regions of Macedonia. Some of them (in the Shar Planina Mountains, Ograzhden Mountains and Jakupica Mountains) were conducted as research projects for the Biology Students' Research Society. Voucher specimens from this study are retained in the author's private collection and in the collection of Ljubomir Stefanov (Skopje).

Results and discussion

The world distribution of *Araschnia levana* covers Central and East Europe, Central Asia to North-East China, Korea and Japan. Within the Balkans it is not reported from Albania, Macedonia and Central and South Greece (Pamperis 1997; Tolman 1997).

The only data concerning the presence of *A. levana* in Macedonia is that in Thomas (1993). That paper is in effect the field diary of Werner Thomas, published after his death but it has apparently been overlooked in subsequent works, such as Tolman (1997) and Krpac & Mihajlova (1997). However, as a result of the present research, conducted over the past eight years, 13 examples of *Araschnia levana* were encountered in seven regions in the Republic of Macedonia. Regions, localities, altitude, habitat type, date, number of specimens and collection where the specimens are kept, are given in the following list:

Shar Planina Mountains

Kuchi Baba (Tri Vodi), 1330 m, road in the beech forest, 18.06.1996 (not collected). Recorded by Slavcho Hristovski - Skopje.

Skopje region
Katlanovo (Laka), 400 m, 01.08.1999, along River Pchinja, riparian habitat: 1 ex. (not collected). Recorded by Metodija Velevski - Skopje.

Jakupica Mountains
Above v. Nezhilovo, 800-900 m, road in oak forest, 17,18,19.07.1999: 4 ex. (coll. D. Melovski).

Kavadarci region
Moglishte, Vatasha, 500 m, 08.04.2001: 2 ex. (coll. Lj. Stefanov).

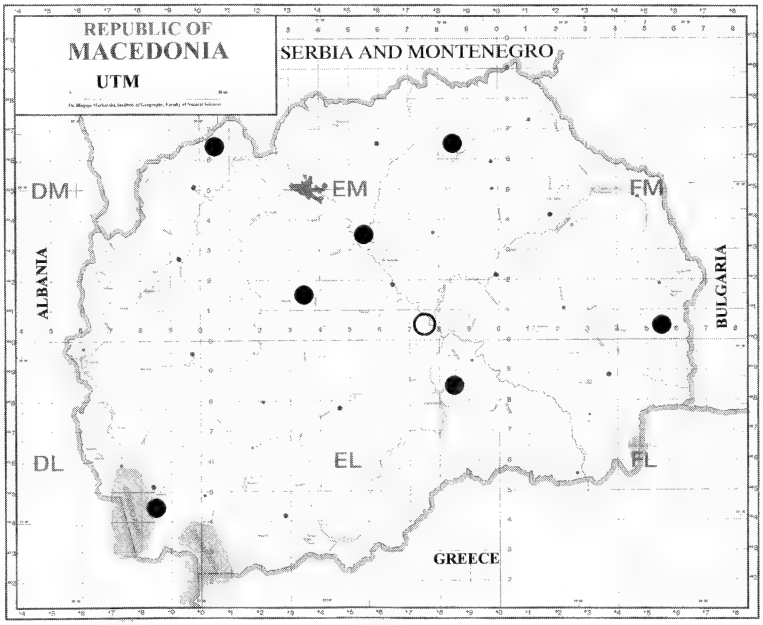

Fig. 1. Distribution of *Araschnia levana* in Macedonia
- ● **New data**
- ○ Data published by Thomas (1993)

Ograzhden Mountains
Ezhovo Brdo, 1150 m, near mountain stream, 15.07.2000: 1 ex. (coll. D. Melovski);
1 km W of Suvi Laki, 950 m, near mountain stream, 17.07.2000: 1 ex. (coll. D. Melovski).

Kratovo region
v. Kuklica, near Kriva Reka river, 650 m, willow belt, 23.06.2004: 2 ex. (coll. Lj. Melovski).

Galichica Mountains
v. Elshani, fields with hedgerows of *Juglans regia*, on flower of *Sambucus ebulus*, 23.07.2004: 1 ex. (photographed by Lj. Stefanov).

The distribution of *Araschnia levana* in Macedonia is presented on Fig. 1. Specimens from The Shar Planina, Jakupica, Ograzhden and Galichica Mountains and the Skopje and Kratovo regions were summer forms, collected from late June to the end of July. The only spring forms were recorded in the Kavadarci region, recorded in April.

The habitats from which the adult *Araschnia levana* were recorded were beech forests on Shar Planina Mountains, oak forests on Jakupica Mountains and riparian habitats along the Rivers Pchinja and Kriva Reka and near a mountain stream on Ograzhden Mountain. The record on Galichica Mountain refers to agricultural land, but this is situated in the oak belt of the mountain.

Acknowledgements

I would like to thank Dr. S. Abadjiev (Sofia, Bulgaria) for his valuable help and Slavcho Hristovski for his guidance during preparation of this paper.

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Square-spotted Clay *Xestia rhomboidea* (Esp.) (Lep.: Noctuidae) in Essex, first discovery of the caterpillar in the county

On 15 March 2004, a caterpillar of the Square-spotted Clay *Xestia rhomboidea* was found at Free Wood, Elmdon, in Essex, the first ever found in the county, providing proof that the moth is resident in Essex. It was found by Robin Field at 20.47 hours, at rest head downwards on a dead stem of Common Nettle *Urtica dioica* above fresh nettle foliage at the end of a search by nine of us from 20.20 to 20.50 hours. The larva was in an area of fairly sparse ground vegetation just inside the edge of the wood. The accompanying photograph, taken at the time, shows the habitat at the exact spot. Colin Plant (centre) is pointing at the larva with his torch. It is between him and the bag on the ground. There are shrubs within three metres, but the larva is in a more open situation and there are scattered grass tussocks for shelter.

It is instructive to examine how this result is the culmination of the combined efforts of various members of the mothing community, coupled with an increasingly

Standing over the first larva of *X. rhomboidea* discovered in Essex, at Free Wood, Elmdon, 25 March 2004.

focused and strategic approach resulting from the UK Biodiversity Action Plan process. The search was stimulated by the recent publication of *The Moths of Essex*, compiled by Brian Goodey (2004), which was launched at the annual meeting of the Essex Moth Group, on 28 February 2004. The status of the Square-spotted Clay in Essex is given therein as vagrant, rare, with 2002 the most recent record, but a note that Phil Jenner has been recording the adult as frequent in the Chrishall area, in the extreme north-west of the county, suggested the moth might be resident. As a result PW contacted Phil Jenner and was able to propose the search at the Essex Moth Group meeting. It transpires that Phil moved to Chrishall in 2000 and has been recording about half a dozen adult Square-spotted Clay annually at sugar patches. He had kept some voucher specimens which supported the records and had taken the trouble to send the data to the county recorder. Meanwhile, John Chainey and Jenny Spence had noticed and reported two adults nectaring on some flowers of a teasel *Dipsacus* on 9 August 2002 along the north edge of Free Wood, which is just 3 km to the east of Phil Jenner's garden. By day on 15 March 2004, Phil and PW reconnoitered the environs of Phil's garden and went to Free Wood and three other nearby woodlands with records of the moth, one in Essex and the others across the county boundary in Hertfordshire. PW was able to select the most promising places to search for the larvae, based on knowledge gained and the many successful searches we have made as part of the project. As soon as it was dark, all three of the Essex sites were searched by a team of volunteers, and the larva was found exactly where John Chainey had seen the adults at Free Wood. The volunteer searchers who came forward were, in part, motivated by the chance see the caterpillar of this nationally scarce moth for the first time and to learn how to search for it. Armed

with this knowledge, they were able to plan searches for larvae at other sites. Subsequently, on the night of 16 March 2004 Jim Reid searched Melwood, a small woodland near Meldreth, Cambridgeshire and found six Square-spotted Clay larvae in ten minutes searching. On 17 March Ted Ponting found two more larvae in Essex, feeding on Common Nettle next to an elm copse in Langley Upper Green.

The map for the Square-spotted Clay in *The Moths of Essex* shows that all the records for that county since 1990 are from two 10 km squares in the extreme north-west. Only one of these has earlier records, from 1960-89. However, shading of eight additional 10 km squares scattered around the periphery of Essex shows that the Square-spotted Clay was recorded more widely prior to 1960.

The larval search was undertaken as a part of a three year Biodiversity Action Plan project on this moth, being co-ordinated by the authors for Butterfly Conservation's Cambridgeshire and Essex Branch, with assistance from the Centre for Environment and Rural Affairs at Writtle College, Essex and a grant from English Nature. An abbreviated account of the discovery has already been presented in *British Wildlife* 15(5): 361-362). One correction has been made to that work – Phil Jenner moved to Chrishall in 2000, not 1999 as previously stated.— PAUL WARING and ROBIN FIELD, Centre for Environment & Rural Affairs, Writtle College, Essex. Contact address: Windmill View, 1366 Lincoln Road, Werrington, Peterborough PE4 6 LS (E-mail: paul_waring@btinternet.com).

Larval foodplants of the Barred Sallow moth *Xanthia aurago* (D. & S.) (Lep.: Noctuidae)

Some of the species of moths of the genus *Xanthia* are Nationally Scarce, others of Local status. Most are associated with woody plant species which are often minor components of the tree and shrub layer. As such, they are of great use to ecologists and conservationists. Presence of these moths helps in making the case for surveys to find out the distribution of such tree species on site. It also provides justification for special conservation measures to ensure adequate representation of such plants for all dependent invertebrates when felling, thinning, coppicing and other forms of management are planned. The Orange Sallow *X. citrago* feeds on limes *Tilia* spp., the Dusky Lemon Sallow *X. gilvago* on Wych Elm *Ulmus glabra* and the Pale Lemon Sallow *X. ocellaris* on Black Poplar *Populus nigra* and hybrids. The much more widespread, well-distributed and numerous Sallow *X. icteritia* and Pink-barred Sallow *X. togata* feed on a range of sallows and poplars but begin larval development in the catkins and are of great use in flagging up the need to maintain trees of these species large enough to produce catkins, which are hugely important as sources of nectar and other food for a great many insects. Furthermore, the genus *Salix* is now recognised as supporting more species of insects in Britain than any other plant genus, including *Quercus* (Kennedy & Southwood, 1984. The number of species of insects associated with British trees: a re-analysis. *Journal of Animal Ecology* **53**: 455-478).

The remaining member of the genus *Xanthia* in the British Isles is the Barred Sallow *X. aurago*. Since the nineteenth century, the standard textbooks state that this feeds on Beech *Fagus sylvatica* and Field Maple *Acer campestre*. From an ecologist's point of view, Beech is absent or not native over much of the range of the moth in Britain and on many sites the moth is therefore assumed to be dependent on Field Maple. This adds another dimension, because Field Maple is regarded as an indicator of ancient woodland sites in some parts of Britain (Rackham, 1980. *Ancient Woodland*). Accuracy in our knowledge of the foodplants of this species (as with many others) can be of considerable importance. Waring, Townsend and Lewington (*op. cit.*) add Pedunculate Oak *Quercus petraea* to the species from which the caterpillar of the Barred Sallow has been obtained from the wild and subsequently reared successfully. This is based on a record of a single larva beaten by Martin Townsend in Wychwood Forest, Oxfordshire in the spring of 2000, the adult emerging successfully in September 2000. Whilst having no reason to doubt this record, I decided I would try and obtain some eggs from the next female Barred Sallow I trapped so that I could rear the larvae and investigate their ability to feed on the stated foodplants. As Maple (Aceraceae), Beech and Oak (Fagaceae) is an odd combination of unrelated plants, I determined I would also offer other plants that are frequent where the moth occurs. In this I was intrigued to find that in Austria the Barred Sallow is considered polyphagous, according to the "HOSTS" database of larval host plants on the website of the Natural History Museum, although their source apparently does not list the species from which it has been obtained. Heath & Emmet (1984, *The moths of Great Britain and Ireland*. Vol. 10) in fact add that in captivity the larvae will accept Hornbeam *Carpinus betulus*, which is also listed by Allan (1947. *Larval foodplants*) who adds Sycamore *Acer pseudoplatanus* - a close relative of maples. The only other foodplant listed on the HOSTS website is *Vaccinium* (species not specified) based on a report from Finland.

On 28 September 2003, I light-trapped a female Barred Sallow in fresh condition in a Robinson light-trap in my garden in Peterborough. By 1 October, she had laid about thirty, bright orange eggs. These were over-wintered outdoors in a metal dustbin in a shady place at the far end of my garden. On 31 March 2004, the Field Maple in a hedgerow of native species I have established along one boundary had just started coming into leaf so I brought half of the batch of eggs indoors with leaves, for observation, and supplied the rest with leaves outdoors. On 2 April, the eggs started to hatch both indoors and outdoors and the signs of larvae feeding on the leaves were apparent the next day. Black frass was also seen collecting in loosespinnings of silk made over the underside of the leaves by the first instar larvae. The larvae grew rapidly as they were taken around the country on various trips, spending most of their time in the warmth of the car or indoors, so while their hatching time was probably about the same as in the wild, their development was likely to have been accelerated by higher temperatures. By 22 April, when I had a chance to begin experiments, the larvae had just started their final instar and had been feeding solely on Field Maple foliage. On 22 April, I offered several of the larvae freshly expanded Beech leaves from the local woodlands. These they accepted

straight away and consumed large areas of the leaf. While the leaves of Field Maple and Beech had nearly reached full-size by this date, it is worth noting that the leaves on the oaks were still small, brownish and furled. On 23 April, I divided the larvae between a number of containers, one or two larvae in each, with each container holding exclusively the foliage of Pedunculate Oak, Common Hawthorn *Crataegus monogyna*, Hazel *Corylus avellana*, English Elm *Ulmus procera*, or Goat Willow *Salix caprea*, while retaining other larvae on Field Maple and Beech. Twenty-four hours later the leaves of all the above species showed extensive feeding damage, evidence of sustained feeding by all the larvae. The larvae were inspected that morning at 08.00 hours, at which time several were actively feeding in the subdued light in the garage where they were kept. On 24 April, fresh leaves of the same species were added to each container, placing them over the leaves from the previous day, and one leaf of Field Maple was also added to see if this would be devoured in preference to the other species. Twenty-four hours later, at 10.00 hours on 25 April, the results were as follows: The larvae on Oak had eaten all the furled leaves and only the bracts remained, but the leaf of Field Maple in the box was completely undamaged. Likewise those on Elm and Beech had eaten large holes in the leaves (about 25% of leaf area consumed), but had not touched the Maple leaf. Those on Goat Willow and Hazel had continued to eat more, consuming up to 50% of the area of the smaller-sized leaves, but had also eaten a large amount of the Maple leaf. Those on the Common Hawthorn had eaten a little more but had damaged the Maple leaves extensively, consuming up to 50%, as had those on Maple alone. Several of the larvae were still in the act of feeding at this time. Evidently the larvae had not sought out the Maple leaves in strong preference over the other species available and some of the larvae may not have discovered the Maple leaves at all overnight.

Clearly, final instar larvae of the Barred Sallow are capable of feeding on the foliage of a wide range of unrelated broad-leaves in captivity. It is common experience that larvae often feed on a wider range of foodplants in confinement and in mainland Europe than they do in the wild in the British Isles, where they are often on the edge of their range and appear to be more restricted in habitat as well as foodplant. It is also frequently found that late instar larvae will eat and thrive on a wider range of foodplants than are accepted by the first instar. Both these observations limit the extent to which the above findings can be extrapolated to what happens in the wild in the British Isles, but at the very least we should be cautious in assuming that Field Maple, Beech and perhaps Oak are the only plants which our native populations of Barred Sallow are exploiting. Personally, I have never knowingly beaten the larva of the Barred Sallow in twenty years of beating a wide range of plants for moth larvae throughout the year. However, I have never searched for this species in particular and have beaten very little Field Maple or Beech in April or early May and at night. Accordingly, on the night of 14 May 2004 I went out to search one of our nearest and best stands of Field Maple, at Brakes Wood on the Milton Estate, near Castor Hanglands National Nature Reserve, Peterborough, accompanied by Mick Beeson. I spent 30 minutes beating from 23.00-23.30 hours but found no larvae of the Barred Sallow. I hope to try again on a range of dates and

sites in 2005. Meanwhile, if anyone has found and fed wild larvae of this species, particularly on foodplants other than Field Maple and Beech, I would be interested to hear from them.

Incidentally, the orange colour and domed shape of the freshly laid egg of the Barred Sallow is a perfect match to the small cushions of an orange mould which often develop on the stems of Field Maple, birches and probably other shrubs in the autumn. Later the fertile eggs turn a less conspicuous inky blue, in which state they remain until hatching in the spring. Infertile eggs can remain orange in the spring. I can also confirm that the larvae rest within their cocoons for several weeks before pupating and that adult moths were successfully reared from larvae no matter which of the above foodplants they had eaten in the final instar, though for practical reasons all of them were reared predominantly on Field Maple before and after the described feeding experiments.

I would like to thank Mick Beeson of the Milton Estate, Peterborough, for his help both in the field and in obtaining access permission from the Estate and Writtle College, Essex, for support in writing up these observations.— PAUL WARING, Reader, Centre for Environment & Rural Affairs, Writtle College, Essex. Address for correspondence: Windmill View, 1366 Lincoln Road, Werrington, Peterborough PE4 6LS.

ADDENDA ET CORRIGENDA

The following errors in relation to volume 115 (2003) have been communicated to the Editor:

page 284 The Queen of Spain Fritillary *Issoria lathonia* (L.) was recorded in Staffordshire on 3 August 2003, not on 30 August 2003 as printed. We apologise for this typing error on our part.

page 280 We are advised that the captions to Plates L and M are transposed. Thus, the upper picture, Plate L, is of the specimen collected at Charleval whilst the lower picture, Plate M, is that taken at St. Pierre de Vassols.

The following correction to volume 113 (for the year 2001) has been submitted.

pages 266 and 267. A section of text is missing, between the final word *'Gegenes'* ending page 266 and 'annually' on page 267. The complete sentence overlapping these two pages should read: "Two new butterfly species have been added to the Híos list, *Gegenes pumilio* (Hoffmansegg, 1804) (April 2000 at Kambiá Beach in north-west Híos; Dr Mike Hull) and *Danaus chrysippus* (Linnaeus, 1758) (recorded annually since 1996; voucher specimen taken at Káto Faná in south Híos in May 1996; Mr Mike Taylor)."

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